

[Replacement Claim 43:]

43. (amended) The process of claim 42, wherein the chlorine treatment reduces the size of at least a portion of chromia particles in the tube, reduces the concentration of chromia particles in the tube, or both reduces the size of at least a portion of chromia particles in the tube and reduces the concentration of chromia particles in the tube.

[Replacement Claim 44:]

44. (amended) The process of claim 34, wherein the tube is an overlapping tube or a substrate tube.

REMARKS

Claims 1-10, 12-26, and 28-44 are currently pending.

10 Claim 1 has been amended to include all limitations of original claim 11.

Claim 20 has been amended to correct punctuation.

Claim 22 has been amended to include all limitations of original claim 27.

Previously filed claims 65-75 have been renumbered as claims 34-44 as requested by the Examiner.

15 In claims 34, 39, 40, 43, (i.e., previously filed claims 65, 70, 71, 74) "body" has been replaced by --tube--.

Objected to Claims

20 The Office Action stated that claim 11 would be allowable if amended to include all limitations of base and intervening claims, i.e., original claim 1. Amended claim 1 includes all limitations of original claims 1 and 11 and thus, should be allowable.

The Office Action stated that claim 27 would be allowable if amended to include all limitations of base and intervening claims, i.e., original claim 22. Amended claim 22 includes all limitations of original claims 22 and 27 and thus, should be allowable.

25 Claims 2-10, 12-21, 23-26, and 28-33 should also be allowed, because each of these claims depends on an allowable claim.

IDS under 37 C.F.R. § 1.97(b)

The Examiner had refused to consider references filed with an Information Disclosure Statement (IDS) on July 24, 2001 because of the IDS's form. To obtain

consideration of the references, Applicants' Representatives held an interview with Examiner Hoffmann on April 24, 2002. Prior to the Interview, a proposed form for a new IDS was transmitted to Examiner Hoffman. During the interview, Examiner Hoffman agreed to consider a translation of Japanese Patent Document 1-64740 in a new IDS provided that entry AA on the proposed form for the IDS was modified to indicate Translation "Included". Examiner Hoffman also agreed to consider an Abstract of Japanese Publication 01069532 in a new IDS without any changes to entry AC on the proposed form for the IDS. See Examiner's Interview Summary (Paper No. 6) and Applicant's Interview Summary (showing changes to proposed form of the new IDS that Examiner agreed would be acceptable).

Applicants resubmit the above-discussed references with a new IDS having the form that the Examiner has agreed would be acceptable. Applicants request that the Examiner consider the references as required under 37 C.F.R. § 1.97.

Prior Art Rejections in Parent Application

The only remaining rejection of independent claim 34 and dependent claims 35-44 is an obviousness rejection over U.S. Patent No. 5,356,447 ("Bhandarkar") ("Bhandarkar") in view of U.S. Patent No. 4,264,347 ("Shintani"). As explained below, these references do not render claim 34 obvious for several reasons.

A. Use of Shintani's gases in Bhandarkar's method was not a substitution of equivalents known for the same function

The Office Action (OA) states that "Bhandarkar teaches the method as claimed except for the use of the specific gas". OA, page 5, last paragraph. Claim 34 recites a gas comprising one or more non-oxygenated sulfur halides. The Office Action further states that Shintani teaches "which gases can be used to remove impurities from silica fiber preforms." OA, page 5, last line, to page 6, line 1. The Office Action concludes that it would have been obvious to substitute Shintani's gases for gases used in Bhandarkar's method "because it is the mere substitution of one known cleaning gas for another." Office Action, page 6, lines 1-3. Thus, a "substitution of equivalents" argument is the basis of the obviousness rejection of claim 34.

"Substitution of equivalents" is a basis for finding obviousness when an invention can be obtained from a prior art method by substituting a known prior art equivalent for

an element in the method. This basis for finding obviousness requires that the prior art recognize the substituting element as a known equivalent for the element being replaced. See M.P.E.P. § 2144.06; in re Ruff, 256 F.2d 590, 118 U.S.P.Q. 340 (CCPA 1958).

5 Since the substituting element is an "equivalent", the prior art must recognize an equivalency of the substituting element for the "same function" as the element being replaced in the prior art method. Otherwise, there is not an equivalency argument for obviousness.

In the present case, the Office Action argues that Bhandarkar's gases and Shintani's gases were both known cleaning gases and thus, equivalents in the prior art. 10 Even if both gases were recognized by the prior art as "cleaning gases", such a recognition is not sufficient to show obviousness under a "substitution of equivalents" argument. Instead a substitution of equivalents argument requires a showing that Shintani's gases were known equivalents for the function of gases used in Bhandarkar's method. As shown below, Shintani's gases and Bhandarkar's gases were not known 15 equivalents for the function important to Bhandarkar's method.

Bhandarkar describes a gas-based method for removing refractory particles from optical fiber preforms. Bhandarkar, col. 1, line 64, to col. 2, line 2. Bhandarkar describes the function of active gases of his method, e.g., SOCl_2 , as reacting with refractory particles to yield a gaseous reaction products. Bhandarkar, claim 1 and col. 4, lines 19- 20 27. In Bhandarkar's gas-based method, the gaseous reaction products are removed to effectively remove the refractory particles. "Reacting with refractory particles to yield gaseous reaction products" is the important function of the gases used in Bhandarkar's gas-based method. See Declaration of Mandich and Reents, dated April 22, 2002, par. 5. For that reason, substituting one of Shintani's gases for a gas in Bhandarkar's method 25 would only make pending claim 34 obvious if the prior art recognized that Shintani's gases were capable of "reacting with refractory particles to yield gaseous reaction products".

Instead of the "reacting function" important to Bhandarkar's method, Shintani discloses that his chemical agents or gases, provide a "glass surface treating functions". 30 Shintani, abstract and col. 5, lines 46-61. In particular, Shintani describes the surface treating functions as, in the presence of oxygen, modifying a "thin surface layer ...to a

glass layer containing [a] substance" so that the modified surface layers have "enhanced chemical affinity for each other... or a reduced glass viscosity, ..." Shintani, col. 5, lines 46 – 61. Thus, Shintani teaches that his surface treatment agents or gases function to reduce viscosities of surface glass layers and to increase affinities of such surface layers for other glass layers. Declaration of Mandich and Reents, dated April 22, 2002, par. 6. Shintani also teaches that the surface treating function results in the removal of imperfections like voids from glass surfaces. Shintani, col. 5, lines 59-61.

The surface treating functions recognized for Shintani's chemical agents are not equivalent to the reacting function important to Bhandarkar's method, i.e., reacting with refractory particles to yield gaseous reaction products. See Declaration of Mandich and Reents, dated April 22, 2002, par. 7. In particular, the reacting function and surface treating functions do not provide the same types of physical products. The reacting function produces gaseous products that are important to Bhandarkar's gaseous removal method. The surface treating function produces viscous layers, i.e., liquids. This difference in products, i.e., gases as opposed to liquids, shows that Shintani's gases were not recognized as functional equivalents of the gases of Bhandarkar's method. One of skill in the art would not recognize Shintani's gases and Bhandarkar's gases as substitutable equivalents based on teachings in Shintani and Bhandarkar. See Declaration of Mandich and Reents, dated April 22, 2002, par. 8.

Since the Examiner has not shown that the prior art recognized equivalent functions for Shintani's gases and Bhandarkar's gases, claim 34 is not obvious based on a substitution of equivalents argument, and the obviousness rejection should be withdrawn.

B. No Prima Facie obviousness without prior art suggestion
to modify Bhandarkar or combine with Shintani

As stated by the Federal Circuit, "[t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." In re Gordon, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984) (underlining added). For a proper obviousness rejection over Bhandarkar in view of Shintani, the Examiner must show that prior art suggests either modifying Bhandarkar or combining Bhandarkar with teachings of Shintani. With respect to modifying the method of Bhandarkar, the Examiner states that " Bhandarkar

discloses ... experimentation was performed to determine the most optimal gas (col. 4, line 8). It would have been obvious to perform additional routine experimentation to determine what the best gas is." OA, page 5, last 3 lines. Even if Bhandarkar performed experimentation to find an optimal gas, Bhandarkar does not suggest or motivate

5 modifying his method to find a better gas. In fact, Bhandarkar states:

It is likely that SOCl₂ will be preferred as the prime or sole chlorine-containing ingredient. Explanation for effectiveness is likely related to presence of moiety SO⁻. ... Experimental findings strongly suggest that particle removal may be due to SO⁻ to an equal extend or greater extent than to released chlorine. Related halogen-
10 containing compounds may serve to remove the refractory particles. Experimentation thus far has not identified anything of effectiveness equal to that of SOCl₂.

Bhandarkar, col. 3, line 64, to col. 4, line 9 (underlining added).

Thus, Bhandarkar praises the effectiveness of a particular gas, i.e., SOCl₂, rather than suggesting that one search for better gases as insinuated in the Office Action at page 5,
15 last 4 lines. Finally, the Office Action points to no specific problem with Bhandarkar's method that would motivate a skilled person to search for new gases to use therein.

The Examiner disputes the need for a prior art suggestion to modify or combine in order that the obviousness rejection over Bhandarkar be proper. In particular, the Office Action states that "Bhandarkar clearly leaves the possibility that superior cleaning
20 compounds may be found. Looking at the totality of both references one WOULD expect success in modifying Bhandarkar..." . OA, page 7, last paragraph. These statements are nothing more than "obvious to try" arguments, and it is well established that "obvious to try" is not a proper basis for an obviousness rejection. See e.g., In re Goodwin, 576 F. 2d 375, 198 U.S.P.Q. 1 (CCPA 1978); In re Fine, 837 F.2d 1071, 1075,
25 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). A prima facie obviousness case must provide a specific suggestion for modifying and/or combining prior art.

Since no specific prior art suggestion for modifying Bhandarkar has been provided, the prima facie obviousness case for pending claim 34 is improper and the rejection should be withdrawn.

30 C. Claim to method using non-oxygenated sulfur halides goes against teachings of Bhandarkar

In describing the effectiveness of SOCl₂, Bhandarkar says that an "[e]xplanation for [its] effectiveness is likely related to the presence of the moiety SO⁻." Bhandarkar,

col. 3, 67-68. He further states that "[e]xperimental findings strongly suggest that particle removal may be due to SO^- to an equal or greater extent than to released chlorine." Bhandarkar, col. 4, lines 3-6. He further states that "[e]xperimentation thus far has not identified anything of effectiveness equal to that of SOCl_2 ." Bhandarkar, col. 4,

5 lines 6-9.

Based on these teachings, if a skilled person searching for new gases to use in Bhandarkar's method would have explored compounds with a SO^- moiety, i.e., oxygenated compounds, rather than non-oxygenated compounds as recited in pending claim 34. Looking for non-oxygenated sulfur compounds goes against Bhandarkar's

10 teachings that the oxygenated SO^- moiety is probably to a great extent the reason for the effectiveness of the preferred compound, i.e., SOCl_2 . As noted by the Federal Circuit, "[e]vidence that supports, rather than negates, patentability must be fairly considered." In re Dow Chemical, 837 F.2d 469, 5 U.S.P.Q.2d 1529, 1531-32 (Fed. Cir. 1988). See also, W.L. Gore v. Garlock, 721 F.2d 1540, 220 U.S.P.Q. 303, 312 (Fed. Cir. 1983). The

15 Examiner must consider these teachings that go against trying "non-oxygenated compounds", when deciding whether any claim reciting such compounds is obvious. These teachings strongly support the non-obviousness of pending claim 34.

20 D. The fact that oxygen and sulfur are both in group VIB does not make a substitution of non-oxygenated sulfur halides for oxygenated sulfur halides obvious

Contrary to statements at page 6, lines 3-5, of the Office Action, the bare fact that oxygen and sulfur are both group VIB atoms does not make the claimed method, which is based on non-oxygenated sulfur halides, obvious over Bhandarkar's method, which uses oxygenated sulfur halides. In fact, contrary to a statement at page 6, lines 3-5, of the

25 Office Action, non-oxygenated and oxygenated sulfur halides are not chemical homologs. Chemical homologs are compounds that differ by addition of a chemical group. See e.g., In re Wilder, 563 F.2d 457, 195 U.S.P.Q. 426 (CCPA 1977). Since oxygenated sulfur halides and non-oxygenated sulfur halides do not differ by addition of such a group, they are not homologs. The Office Action provides no other chemical structural basis for

30 expecting that the non-oxygenated and oxygenated sulfur halides have similar properties.

It should also be noted that all relevant facts should be considered together with chemical structural similarities when determining whether a prior art method based on one compound makes a method based on another compound obvious. In the present case, Bhandarkar suggests that presence of a SO^- moiety in a gas for his method is preferable.

5 For example, Bhandarkar states that an "[e]xplanation for effectiveness [of SOCl_2] is likely related to presence of the SO^- moiety", e.g., which as a "reducing ion may extract small residual amounts of O_2 ." Bhandarkar, col. 3, line 67, to col. 4., line 1. Teaching the effectiveness of a SO^- moiety teaches against substituting a non-oxygenated sulfur gas, i.e., as in claim 34, for gases used by Bhandarkar, because SO^- moieties are absent in
10 non-oxygenated gases.

E. A skilled person would not have had a reasonable expectation that
modifying Bhandarkar based on Shintani would be successful

The Office Action provides no indication that any technique of Shintani would have been desirable in the Bhandarkar process. To the contrary, for at least three reasons,
15 a skilled person would not have expected success in modifying Bhandarkar based on teachings of Shintani.

(1) Bhandarkar states that effective particle removal requires that essentially no oxygen be present, e.g., less than 1 ppm. Bhandarkar, col. 3, lines 55-63. By contrast, Shintani relies on using oxygen with his surface treating agent or gas. See, e.g., Shintani,
20 col. 2, lines 62-65 and abstract. In fact, Shintani uses large amounts of oxygen, e.g., 0.1 to 200 parts surface treating gas to 100 parts oxygen, more preferably 1 to 50 parts treating gas to 100 parts oxygen. See Shintani, col. 7, lines 44-50. There would have been no motivation or expectation of success in combining Bhandarkar's method that seeks to exclude oxygen with Shintani's method that uses a high concentration of oxygen.

25 (2) Bhandarkar states that porosity, i.e., an unsintered body, is essential to his gas method for removing particles. See Bhandarkar, col. 4, lines 53-56. By contrast, the method of Shintani is not performed until after sintering, i.e., Shintani's method treats a consolidated, non-porous glass body. This conclusion follows, e.g., because Shintani performs an HF treatment prior to performing his surface treatment method, and an HF
30 treatment would destroy a porous or unsintered glass body. See Declaration of Mandich and Reents Declaration, dated Dec. 9, 1999, par. 8. There would have been no

motivation to combine Bhandarkar's method for treating a porous or unsintered body with Shintani's method for treating a non-porous body. Nor could there have been any reasonable expectation of success in combining references intended for such differing uses. One would not have expected that compounds of Shintani could produce success in the very different context of the method of Bhandarkar.

(3) Bhandarkar's method removes particles throughout the bulk of a body, i.e., including the interior region—hence the need for porosity. By contrast, Shintani only describes surface treatments. For example, Shintani repeatedly refers to the treating agent or gas as a "glass surface treating agent" and discusses methods involving "surface treatments" or "surface-treated" glass objects. See, e.g., Shintani, col. 2, lines 62-63 and 66; col. 3, lines 5 and 23; col. 4, lines 24-26. There would have been no motivation to combine a method for treating the bulk of a body with chemical agents used in a method for treating the surface of a body.

As noted above, Shintani's method teaches the use of agents in the presence of oxygen to clean surfaces of sintered nonporous glass bodies, whereas Bhandarkar's method uses agents in the absence of oxygen, to clean the bulk of unsintered porous bodies. The Examiner points to nothing that would suggest a desirability of combining aspects of these very different methods. Nothing would have suggested that a reasonable probability of success would result from substituting one of Shintani's agents or gases in the very different method of Bhandarkar. Rather the Examiner is using hindsight to improperly motivate his combination of teachings of Shintani in the method of Bhandarkar.

F. Even a combination of the references would not have led to the claimed invention

Even if one skilled in the art were motivated to combine Bhandarkar and Shintani, the combination would not have led to applicants' claimed invention, i.e., claim 34.

As already noted, Bhandarkar suggests that the SO^- moiety is probably preferable for effective removal of the refractory metal oxide particles. See Bhandarkar, col. 3, line 67 to col. 4, line 6. Thus, if a skilled person had been motivated to search for new compounds for use in Bhandarkar's method, Bhandarkar itself would have led that person to primarily if not exclusively to try new compounds that contain the SO^- moiety.

Shintani would not have suggested otherwise, because Shintani readily provided that skilled person with a list of SO^- containing compounds. In particular, at col. 7, lines 16 to 43, Shintani lists over 70 specific surface treating agents including SO_2 and oxygenated sulfur halides like SOF_2 , SOCl_2 , SOBr_2 , SO_2F_2 , SO_2Cl_2 , $\text{CO}_2(\text{OH})\text{F}$, $\text{S}_2\text{O}_5\text{Cl}_2$, $\text{SO}_2(\text{OH})\text{Cl}$, and $\text{SO}(\text{OH})\text{F}$. Based on the teachings of Bhandarkar, the skilled person would have very probably tried to use Shintani's oxygenated sulfur agents rather than Shintani's non-oxygenated sulfur halides. Bhandarkar's statements on the importance of the SO^- moiety would have guided a person looking to modify Bhandarkar's method towards the oxygenated sulfur gases rather than towards the non-oxygenated sulfur halides recited in pending claim 34.

For the above-stated reasons, Bhandarkar and Shintani do not render independent claim 34 or dependent claims 35-44 obvious.

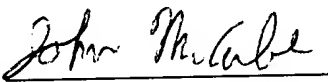
Applicants respectfully request allowance of claims 1-11, 13-26, and 28-44.

NO FEE DUE.

In the event of any non-payment or improper payment of a required fee, the Commissioner is authorized to charge or to credit **Lucent Technologies Deposit Account No. 12-2325** to correct the error.

Respectfully submitted,

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Date: May 22, 2002

Lucent Technologies, Inc.
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Attachments:

37 C.F.R. § 1.132 Declaration of M. Mandich and W. Reents, dated April 22, 2002
37 C.F.R. § 1.132 Declaration of M. Mandich and W. Reents, dated Dec. 09, 1999



Marked Up Claim Amendments

- 5 1. (amended) A process for preparing optical fiber, comprising the step of:
drawing fiber from a preform comprising a silica body, the body formed by a
process including the step of, prior to sintering the body, treating the body at a
temperature ranging from 300 to 900°C with a gaseous mixture comprising one or more
non-oxygenated sulfur halides, and
wherein the one or more sulfur halides are generated by reaction of sulfur present
in the body with halides flowed over the body.

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20. (amended) The process of claim 17, wherein the chlorine treatment performs
at least one of: reducing the size of at least a portion of chromia particles in the body and
reducing the concentration of chromia particles in the body.

22. (amended) A process for preparing optical fiber, comprising the step of:
drawing fiber from a preform comprising a sol-gel silica tube, the tube formed by
a process including the step of, prior to sintering the tube, treating the tube at a
temperature ranging from 300 to 900°C with a gaseous mixture comprising one or more
non-oxygenated sulfur chlorides, and
wherein the one or more sulfur chlorides are generated by reaction of sulfur
present in the tube with chlorine flowed over the tube.

~~34~~ 65. (amended) A process for preparing optical fiber, comprising the step of:
drawing fiber from a preform comprising a sol-gel silica tube, the tube formed by
a process including the steps of, prior to sintering the tube:
providing a silica dispersion,
forming from the dispersion a gelled tube comprising water, hydroxyl groups, and
refractory metal oxide particles,
heating the entire tube to a temperature ranging from 400 to 800°C and,
while the tube is at the temperature, treating the tube with a gaseous mixture
comprising one or more non-oxygenated sulfur halides, the treatment performed for a

time period that provides sufficient diffusion of the one or more sulfur halides into the ~~body~~ tube such that at least one effect selected from the group consisting of reducing the concentration of water and hydroxyl groups in the tube, reducing the size of at least a portion of refractory metal oxide particles in the tube, and reducing the concentration of refractory metal oxide particles in the tube, is achieved.

35 ~~66~~. (amended) The process of claim 34 ~~65~~, wherein the temperature of treatment ranges from 600 to 700°C.

36 ~~67~~. (amended) The process of claim 34 ~~65~~, wherein the time period is at least two hours.

37 ~~68~~. (amended) The process of claim 34 ~~65~~, wherein the one or more sulfur halides comprises one or more sulfur chlorides.

38 ~~69~~. (amended) The process of claim 37 ~~68~~, wherein the one or more sulfur chlorides comprise at least one compound selected from the group consisting of sulfur monochloride and sulfur dichloride.

39 ~~70~~. (amended) The process of claim 34 ~~65~~, wherein the treatment reduces the size of at least a portion of refractory metal oxide particles in the tube, reduces the concentration of refractory metal oxide particles in the tube, or both reduces the size of at least a portion of refractory metal oxide particles in the ~~body~~ tube and reduces the concentration of refractory metal oxide particles in the tube.

40 ~~71~~. (amended) The process of claim 34 ~~65~~, wherein the treatment reduces the concentration of water and hydroxyl groups in the ~~body~~ tube.

41 ~~72~~. (amended) The process of claim 37 ~~68~~, wherein the gaseous mixture comprises about 6 to about 7 vol.% of the one or more sulfur chlorides.

42 ~~73~~. (amended) The process of claim 34 ~~65~~, wherein the tube is subjected to a treatment with chlorine gas prior to the treatment with the one or more sulfur halides, wherein the chlorine gas treatment performs at least one action selected from the group consisting of reducing the concentration of water and hydroxyl groups in the tube, reducing the size of at least a portion of chromia particles in the tube, and reducing the concentration of chromia particles in the tube.

43 ~~74~~. (amended) The process of claim 42 ~~73~~, wherein the chlorine treatment reduces the size of at least a portion of chromia particles in the ~~body~~ tube, reduces the concentration of chromia particles in the ~~body~~ tube, or both reduces the size of at least a portion of chromia particles in the ~~body~~ tube and reduces the concentration of chromia particles in the ~~body~~ tube.

44 ~~75~~. (amended) The process of claim 34 ~~65~~, wherein the tube is an overlcladding tube or a substrate tube.